

Description of a New Species of *Eimeria* (Apicomplexa: Eimeriidae) from the Alligator Snapping Turtle, *Macrolemys temminckii* (Testudines: Chelydridae)

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ABSTRACT: Coccidian oocysts recovered from the feces of an alligator snapping turtle, *Macrolemys temminckii* (Harlan, 1835), in Arkansas, were found to represent a previously unreported eimerian. Oocysts of *Eimeria harlani* sp. n. are spherical to subspherical, 13.0×12.6 ($10.4\text{--}14.4 \times 10.4\text{--}13.8$) μm , with a thin, single-layered wall; shape index (length/width) 1.03 (1.00–1.14). A micropyle is absent; oocyst residuum and polar granule present. Sporocysts are ovoidal, 8.9×5.2 ($8.0\text{--}9.6 \times 4.8\text{--}5.6$) μm , with Stieda body; shape index 1.71 (1.57–1.85). A sporocyst residuum is present, consisting of 3–12 granules up to 1.0 μm in diameter. Sporozoites are elongate, 10.5×2.3 ($8.0\text{--}12.0 \times 2.0\text{--}2.6$) μm in situ, arranged head-to-tail in sporocyst.

KEY WORDS: alligator snapping turtle, *Macrolemys temminckii*, Testudines, *Eimeria harlani* sp. n., Apicomplexa, coccidia.

The alligator snapping turtle, *Macrolemys temminckii* (Harlan, 1835), is a large aquatic reptile that ranges from southwestern Georgia and northern Florida west into eastern Texas and north into Kansas, Iowa, Illinois, and southwestern Kentucky (Conant and Collins, 1991). It inhabits rivers, lakes, oxbows, and sloughs where it feeds primarily on fish, other turtles, and carrion (Johnson, 1987). Unfortunately, this species is becoming rare over much of its range due to exploitation as a food resource (Pritchard, 1989).

Although information is available on the biology of the alligator snapping turtle (Pritchard, 1989), little is known about its endoparasites (Mackin, 1936; Cahn, 1937; Ernst and Ernst, 1977) and nothing has been published on coccidian parasites from alligator snapping turtles. Herein we report a new species of *Eimeria* from *M. temminckii* from Arkansas.

Materials and Methods

A single subadult *Macrolemys temminckii* (carapace length 32.5 cm) was collected accidentally in April 1991 by hoop net in the Black River, Jackson County, Arkansas. The turtle was returned to the laboratory, administered an overdose of sodium pentobarbital, and feces collected from the rectum. Feces were initially examined for coccidia using brightfield microscopy following flotation in a sucrose solution (sp. gr. 1.30). Fecal samples were then placed in a thin layer of 2.5% (w/v) aqueous $\text{K}_2\text{Cr}_2\text{O}_7$ solution in shallow Petri dishes, and unsporulated oocysts allowed to develop for 1 wk at room temperature (ca. 23°C). Oocysts were then

concentrated by flotation and measured using an ocular micrometer; oocysts were photographed from wet mounts made using tap water. All measurements are presented in micrometers (μm), followed by the ranges in parentheses.

Results and Discussion

Numerous oocysts were found in the feces of the turtle, which proved to represent a previously undescribed species. Below we present a description of this new coccidian.

Eimeria harlani sp. n. (Figs. 1–3)

DESCRIPTION OF OOCYSTS: Oocysts spherical to subspherical, 13.0×12.6 ($10.4\text{--}14.4 \times 10.4\text{--}13.8$) ($N = 30$); shape index (length/width) 1.03 (1.00–1.14). Wall of single thin layer, ca. 0.5 thick. Micropyle absent; oocyst residuum present, as delicate spherical or subspherical mass of granules usually surrounding vacuolelike structure; polar granule present. Sporocysts ovoidal, 8.9×5.2 ($8.0\text{--}9.6 \times 4.8\text{--}5.6$) ($N = 20$), with thin wall ca. 0.4 thick; shape index 1.71 (1.57–1.83). Stieda body present, as thickening at 1 end of sporocyst; substieda body absent. Sporocyst residuum present, either as 3–12 scattered granules or as compact mass 3.1×2.9 ($1.8\text{--}4.0 \times 1.8\text{--}3.4$) ($N = 7$). Sporozoites elongate, 10.5×2.3 ($8.0\text{--}12.0 \times 2.0\text{--}2.6$) ($N = 20$) in situ, arranged head-to-tail within sporocyst. Posterior ends of sporozoites reflected back along 1 end of spo-

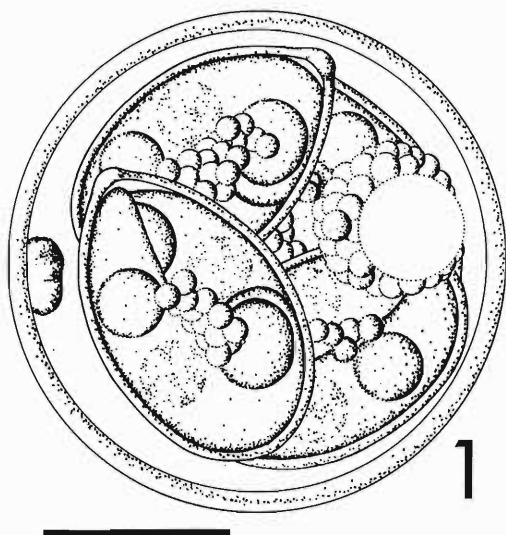


Figure 1. Composite line drawing of sporulated oocyst of *Eimeria harlani* sp. n. Scale bar = 5.0 μ m.

rocyst. Each sporozoite contains a spherical anterior refractile body 1.8 (1.2–2.4) ($N = 20$) and a spherical posterior refractile body 2.2 (1.6–3.0) ($N = 20$). Nucleus located between refractile bodies.

TYPE HOST: *Macrolemys temminckii* (Harlan, 1835) “alligator snapping turtle” (Testudines: Chelydridae). Specimen collected 30 April 1991; voucher specimen deposited in the Arkansas State University Museum of Zoology as ASUMZ 17616.

TYPE SPECIMENS: Syntypes (oocysts in 10% formalin) have been deposited in the U.S. National Museum, Beltsville, Maryland 20705 as USNM No. 82005.

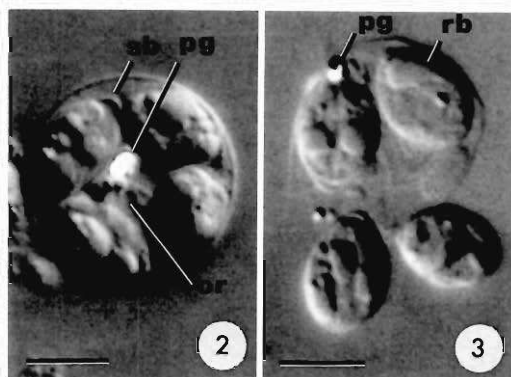
TYPE LOCALITY: Black River, Jackson County, Arkansas, 9.7 km west of Swifton.

SITE OF INFECTION: Unknown. Oocysts recovered from intestinal contents and feces.

SPORULATION: Exogenous. All oocysts were passed unsporulated and became fully sporulated within 1 wk at ca. 23°C.

ETYMOLOGY: The specific epithet is given in honor of Richard Harlan (1796–1843), American vertebrate paleontologist and comparative anatomist, who described the alligator snapping turtle in 1835 originally under the name *Chelonura temminckii* (see Bour, 1987).

REMARKS: No species of coccidian has been reported from alligator snapping turtles previ-



Figures 2, 3. Nomarski interference-contrast photomicrographs of sporulated oocysts of *Eimeria harlani* sp. n. Abbreviations: or, oocyst residuum; pg, polar granule; rb, refractile body; sb, Stieda body. Scale bars = 5.0 μ m.

ously and oocysts of *Eimeria harlani* sp. n. are unlike any reported thus far from the family Chelydridae (McAllister and Upton, 1989; McAllister et al., 1990). Of the named *Eimeria* spp. reported thus far in the family (all from *Chelydra serpentina*), *Eimeria serpentina* McAllister, Upton, and Trauth, 1990 (probable synonym *E. sp.* of Wacha and Christiansen, 1980) has smaller oocysts and lacks an oocyst residuum (Wacha and Christiansen, 1980; McAllister and Upton, 1989; McAllister et al., 1990). *Eimeria chelydrae* Ernst, Stewart, Sampson, and Fincher, 1969, has larger oocysts and sporocysts and lacks a residuum. *Eimeria filamentifera* Wacha and Christiansen, 1979, is considerably larger overall (Ernst et al., 1969; Wacha and Christiansen, 1979). Although *E. mitraria* (Laveran and Mesnil, 1902) Doflein, 1909, has been reported from *Chelydra serpentina* by Wacha and Christiansen (1980), this coccidian may actually have been *Isospora chelydrae* McAllister, Upton, and Trauth, 1990, because the oocysts are similar morphologically (McAllister et al., 1990). Oocysts of these latter 2 species are irregular in shape (Laveran and Mesnil, 1902; McAllister et al., 1990) and cannot be confused with *E. harlani*.

Acknowledgments

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